

## DIAGNOSTIC IMAGING AND ENDOSCOPY OF THE SCHNAUZER DOG WITH UPPER GASTROINTESTINAL TRACT DISORDERS

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### ABSTRACT

The aim of this study was to describe the role of diagnostic imaging and endoscopy to define the diagnose of the upper gastrointestinal tract disorder of the Schnauzer. The information from the owner stated that the dog has been vomiting for a year, sometimes containing blood. There might also be a possibility that it had eaten a *corpus alienum*. This case study covered physical examination, hematology and blood chemical analysis, diagnostic imaging radiography and ultrasonography as well as endoscopy performed. Physical examination showed weight loss and anorexia. Hematology and blood chemical analysis showed an increase in hemoglobin, hematocrit, lymphocyte, ureum, creatinine, alanine aminotransferase (ALT), and alkaline phosphatase (ALP) values. Abdominal radiograph showed no abnormality in the abdominal organs. Abdominal ultrasonography showed a hyperechoic elongated mass attached on the stomach mucosal surface which forms an acoustic shadowing at the ventral. Endoscopy showed pathological lesions that is inconsistency of stomach mucosa surface, foamy fluid in the stomach, ulcers and erosion of the stomach mucosal surface. Based on the diagnostic imaging and endoscopy performed, the animal was clearly diagnosed with chronic gastritis accompanied by stomach ulcer and erosion.

Key words: diagnostic imaging, endoscopy, Schnauzer, upper gastrointestinal tract disorder

### ABSTRAK

Studi kasus ini bertujuan menetapkan diagnosis gangguan saluran pencernaan atas pada anjing Schnauzer melalui pencitraan and endoskopi. Berdasarkan keterangan dari pemilik (anamnesa), anjing mengalami muntah yang intermiten and sesekali disertai darah yang sudah berlangsung selama satu tahun serta diduga anjing tersebut memakan benda asing. Studi kasus yang dilakukan meliputi pemeriksaan fisik, pemeriksaan hematologi and kimia darah, pencitraan radiografi, pencitraan ultrasonografi, serta endoskopi. Hasil pemeriksaan fisik menunjukkan aanya kondisi kekurusan and anoreksia. Pemeriksaan hematologi and kimia darah menunjukkan aanya peningkatan jumlah limfosit, hemoglobin (Hb), hematokrit (Hct), ureum, kreatinin, alanine aminotransferase (ALT), and alkaline phosphatase (ALP). Pencitraan radiografi abdomen menunjukkan tidak terdapat kelainan pada organ-organ di daerah abdomen. Ultrasonografi lambung terlihat bentukan hiperekoik memanjang pada permukaan mukosa lambung yang membentuk acoustic shadowing di bagian ventral namun temuan ini tidak spesifik terhadap satu kelainan tertentu. Hasil endoskopi menunjukkan beberapa lesio patologis yang sangat signifikan yaitu ketidakteraturan mukosa lambung, busa cairan empedu di lambung, ulkus, and erosi lambung. Berdasarkan gabungan hasil diagnosis pencitraan and endoskopi, hewan didiagnosis menderita gastritis kronis disertai ulkus and erosi lambung.

Kata kunci: diagnosis pencitraan, endoskopi, anjing Schnauzer, gangguan saluran pencernaan atas

### INTRODUCTION

Dog is one of domesticated animals that commonly owned by people as pet animal. High interest in raising dog as pet animal has increased potential health problem of this animal. One of the common diseases is gastrointestinal disorder (Amorim *et al.*, 2016; Ruiz *et al.*, 2016).

Gastrointestinal disturbance in dog can be upper digestive tract disorders. Such cases in dog usually involves esophagus (Tarvin *et al.*, 2016), stomach (Hugen *et al.*, 2016), and proximal duodenum (Ruiz *et al.*, 2016). Diagnoses of the disturbance can be done through several steps such as anamneses, signs and physical examination. Supporting diagnostic steps are needed to determine diagnoses toward a case such as hematology and blood chemistry (Allenspach, 2015), radiography imaging diagnoses (Terragni *et al.*, 2014), and ultrasonography (USG) (Le Roux *et al.*, 2016).

Hematology and blood chemistry examination are aimed at helping to complete physical examination data. Radiographic examination is effective for diagnosing diseases of gastrointestinal tract related to digestive tract motility, however, it has limitation in

diagnosing diseases on digestive tract mucosa such as esophaginitis, hyperemia, erosion, and ulcers (Han, 2003). Ultrasonography examination on gastrointestinal tract can be used to detect present of *corpus alienum*, inflammation, neoplasia, and gastric edema (Pennick and d'Anjou, 2008). Endoscopy can be used to see mucosa of digestive tract when radiography and USG imaging cannot confirm diagnose of such case (Moore, 2003).

This study aimed to investigate the role of radiography and ultrasonography imaging and endoscopy to help confirm diagnosis on gastrointestinal tract problem in Schnauzer dog. This study was expected to give information on diagnosing of upper gastrointestinal tract problem in Schnauzer dog that was mentioned in diagnostic method in form of radiography, USG, and endoscopy.

### MATERIALS AND METHODS

#### Animal

This case study was done in My Vets Animal Clinic, Kemang South Jakarta and division of Surgery and Radiology, Department of Clinic Reproduction and

Pathology, Faculty of Veterinary Medicine, Bogor Agricultural University. Animal used was a 1 year 10 months old male Schnauzer dog. The dog weight was 6.5 kg and height was 48 cm.

### Procedures

Stages of the case study involve anamneses, signalement, physical examination, hematology, blood chemistry, radiography, and ultrasonography (two dimension Snodop type S-8X, transducer probe with 4.5-10 Mega Hertz ultrasonography) with endoscopy (Small Animal Gastrocope VET-G1580<sup>®</sup>). Radiography of abdomen using mobile R-120H was done by placing animal in right lateral and dorsal recumbency with X-Ray film underneath. Measurement of thickness of the body was necessary to determine kilo volt peak (KVP). Thickness of the abdomen at right lateral recumbency was 9.5 cm while at dorsal recumbency was 14 cm. Radiography imaging was performed by using value suitable for abdomen based on the thickness of which is 59 and 68 KVP on right lateral recumbency and dorsal recumbency respectively, and with 2 mili ampere second (mAs) on both position. Further step was processing and interpreting the radiography film. Radiography interpretation involve changes in shape, location, size, radio opacity (degree of absorbtion of X-Ray by organ), and number of organ (Thrall, 2002).

Ultrasonography is used to obtain internal structure image of soft tissue such as gastric, intestine, and colon. Ultrasonography was done by determining orientation area and shaving hair on the particular area. The animal was positioned on dorsal recumbency and acoustic gel was applied. Transducer was placed on abdominal area and USG visualization was done in two direction, *sagital*, and transversal. Ultrasonography examination was done on gastric, intestine, liver, kidney, spleen, and *vesica urinaria*. Further step was interpretation of sonogram of change in *echogenicity*, size and texture (Noviana *et al.*, 2012).

The next examination was endoscopy. The animal was fasted for 12 hours to free esophagus mucosa from feed remnant before endoscopy was applied. General anesthesia was applied to smoothen endoscopy process. Premedication with 0.02-0.04 mg/kg BW atropine sulphate 0,025% subcutaneously 15 minutes prior to anesthesia. General anesthesia was done by using 8-12 mg/kg BW ketamine intramuscularly and combined with 1-2 mg/BW xylazine 2% (Plumb, 2005).

Endoscopy was done when the animal in left lateral recumbency with the head of the animal straightened. Laryngoscope was positioned in mouth of the animal to ease insertion of endoscope into digestive tract of the animal. The end of endoscope was inserted slowly into esophagus through pharynx and examination of esophagus and gastric was done.

## RESULTS AND DISCUSSION

Result of this case study was based on stages of examination and diagnose involving sign, anamneses,

examination of physic, hematology, blood chemistry, radiography, ultrasonography, and endoscopy.

### Sign, Anamnesis, and Physical Examination

Sign on this case was 1 year 10 months old male Schnauzer dog with with 6.5 kg body weight and 48 cm height. According to Hawthorne *et al.* (2004), Schnauzer dog with height 43.1-50.8 cm will have ideal weight 12.3-16.8 kg so the sick dog was clearly suffered from emaciation. Based on information from owner, the Schnauzer suffered from intermitten vomit and sometime with blood for the last one year. The owner suspected the dog ate *corpus alienum*.

Physical examination showed that the dog had abnormality in abdominal region. The abdomen was shown as smaller but symmetrical in size. This condition could be caused by *emaciatio*. Some condition mentioned above were not specific clinical sign of the case, but the signs lead to digestive tract disorder such as bloody vomit and *emaciatio*. Differential diagnose based on anamneses and physical examination found were esophaginitis, gastric ulcer, chronic gastritis, hypertrophic gastropathy, stomach tumor, gastric outflow obstruction, inflammatory bowel disease (IBD), gut tumor, disease of liver, and kidney (Tams., 2003; Birchard and Sherding, 2006).

Advanced examination such as hematology, blood chemistry, X-Ray, USG, and endoscopy were needed to confirm diagnosis for this case. Radiography examination could be used to diagnose stomach tumor, gastric outflow obstruction, intestinal tumor, liver disease and kidney disease (Thrall, 2002). Radiography examination was effective to diagnose digestive tract disorder related to motility of the tract but has limitation in diagnosing disease of digestive tract mucosa such as esophaginitis, hyperemia, erosion, and ulcer (Han, 2003). Ultrasonography method can be used to diagnose stomach tumor, intestinal tumor, liver disease, kidney disease, cholestasis, IBD, and *hypertrophic gastropathy* (Penninck and d'Anjou, 2008). Endoscopy method can be used to diagnose cases such as esophaginitis, stomach ulcer, and achronic gastritis (Banerjee and Reddy, 2012).

### Hematology and Blood Chemistry Examination

There were abnormalities in hematology and blood chemistry examination such as hemoglobin (Hb), hematocrit (HCT), lymphocyte, ureum, alanine aminotransferase (ALT), and alkaline phosphatase (ALP). Hemoglobin value increased (21.3 g/dL) while normal value was 12-18 g/dL. Hematocrit value increased (63%) while normal value was 37-55%. Increase in Hb and HCT values was not followed by increase in erythrocyte value and it was called relative erythrocytosis. This condition could be because decrease in plasma volume such as in dehydration. Other hematology parameter that had increased value was lymphocyte. Lymphocyte number in this dog was  $6.2 \times 10^3/\mu\text{l}$  while normal value was  $1-4.8 \times 10^3/\mu\text{l}$ . Increase in number of lymphocyte could be because of chronic infection (Tjahajati *et al.*, 2005).

Ureum level in this dog increased significantly above normal value. Ureum level in normal dog was 10-12 mg/dL while in this dog was 107.3 mg/dL. Creatinine in normal dog was 1-2 mg/dL while the sick dog 2.5 mg/dL. Increase in ureum and creatinine levels in blood (azotemia) might be related to prerenal, intrarenal, or postrenal disturbances. Azotemia prerenal could occur on dehydration, azotemia renal on kidney disease and azotemia post-renal on urolithiasis condition.

Type of azotemia that were related to physical examination result on this case was azotemia prerenal (Margaret, 2012). This related to clinical sign such as vomit that might initiate dehydration. This condition was in accordance with study by Brown and Otto (2008) finding that fluid loss from wide gastrointestinal disease together with reduce intake caused progressive dehydration.

Alanine aminotransferase and alkaline phosphatase value of the dog increased above normal. Normal dog has ALT value 8.2-57.3 IU while the dog had ALT value 125 IU. The ALP value of the dog (106-100.7 IU) was also above normal level (120 IU). The increase of normal ALP concentration indicated damage of hepatocyte that was related to leakage of enzyme from cytoplasm of hepatocyte. Increase in ALP concentration was related to disruption of bile fluid flow in form of cholestasis. Other condition that could increase ALP concentration was young age and corticosteroid therapy. Corticosteroid also increases ALT concentration (Hasoya *et al.*, 2009). The dog used this study was one year ten months old and was on corticosteroid therapy.

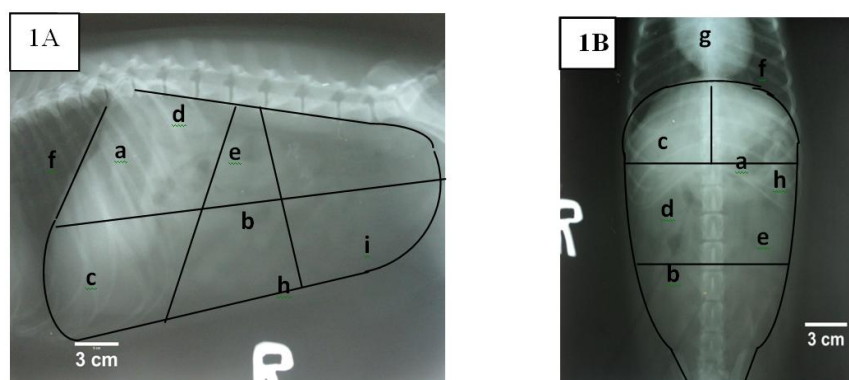
Examination result of hematology and blood chemistry showed several conditions that might be experienced by the dog such as chronic infection, dehydration, hepatocyte damage, and cholestasis.

### Result of Radiography Examination

Radiography examination of the dog was done by positioning the dog on right lateral and dorsal recumbency. Figure 1A and 1B shows the radiograph of dog abdomen. Radiography of abdomen was done based on clinical sign of the case such as blood vomit and emaciation. According to McGrotty (2010), vomit was general presentation in small animal practitioner and might be related to various gastrointestinal diseases and systemic.

Figure 1 showed radiograph of laterolateral (LL) and ventrodorsal (VD) view of the dog. Gastric in Figure 1 had unclear margination and opacity and appeared no size abnormality. Unclear margin of gastric because position of gastric was piled up with liver. Opacity and size of gastric and intestine were greatly vary depending on content of the organs such as food and water (Harvey *et al.*, 2005). On laterolateral position (Figure 1A), gastric was situated in zone 1 and 2, while on ventrodorsal (Figure 1B) it was situated in zone 1, 2, 3. Other organ seen in Figure 1 was intestine. Margin of intestine was clearly seen, opacity, and size of intestine appeared unchanged and located at zone 3. This condition was a normal radiograph of gastric and intestine (Thrall, 2002). Other organs such as kidney, liver, spleen, and *vesica urinaria* appear unchanged in size, margination, radio-opacity, and position.

Result of radiography examination showed that gastric, intestine, liver, kidney, spleen, and *vesica urinaria* were unchanged. Several differential diagnosis for this case that did not correspond with radiography result was gastric tumor, gastric outflow obstruction, and intestine tumor (Thrall, 2002). There were several differential diagnosis that could not be confirmed by using radiography. Therefore, further examination using USG was needed to obtain internal structure of abdominal organs.



**Figure 1.** Radiography of dog abdomen with upper digestive tract (A= Laterolateral view, B= Ventrodorsal view, a= Stomach, b= intestine, c= Liver, d= Right kidney, e= Left kidney, f= Lung, g= Heart, h= Spleen, i= *Vesica urinaria*)

Differential diagnosis based on the hematology and blood chemistry examination result include esophagitis, gastric ulcer, chronic gastritis, *hypertrophic gastropathy*, gastric tumor, *gastric outflow obstruction*, *inflammatory bowel disease* (IBD), intestinal tumor, liver disease, kidney disease, and cholestasis (Birchard and Sherding, 2006; Jerger *et al.*, 2006).

### Ultrasonography Examination

Ultrasonography examination on the dog was done on gastric, intestine, liver, kidney, spleen, and *vesica urinaria*. Examination of these organs related to radiography. Result of radiography examination did not show specific abnormality on these organs so that a through examination was needed for these organs.

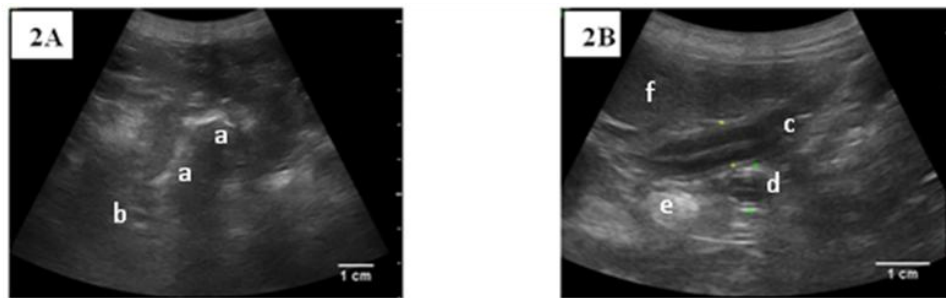
Result of USG examination presented in Figure 2. Figure 2 A showed a sonogram of the dog gastric. The size of gastric in Figure 2A did not show any abnormality but show long *hyperechoic* mass and appeared attached to gastric mucosal surface. The mass formed acoustic shadowing in its ventral. Figure 2B showed sonogram of duodenum. Duodenum mucosal layer in Figure 2B appeared *hypoechoic*, submucosal layer *hyperechoic*, muscular mucosal layer *hypoechoic* and serosa layer thin *hyperechoic* which is a normal condition of duodenum (Penninck and d'Anjou, 2008). Sonogram of other organ such as kidney, liver, spleen, and *vesica urinaria* did not show abnormality in term of texture, *echogenicity*, and size.

Ultrasonography imaging of the dog did not show any abnormality on liver, *vesica fellea*, spleen, kidney, and *vesica urinaria*. Part of digestive tract that showed abnormality was gastric with long *hyperechoic* that attached to gastric mucosa. The mass formed acoustic shadowing in its ventral. Acoustic shado-

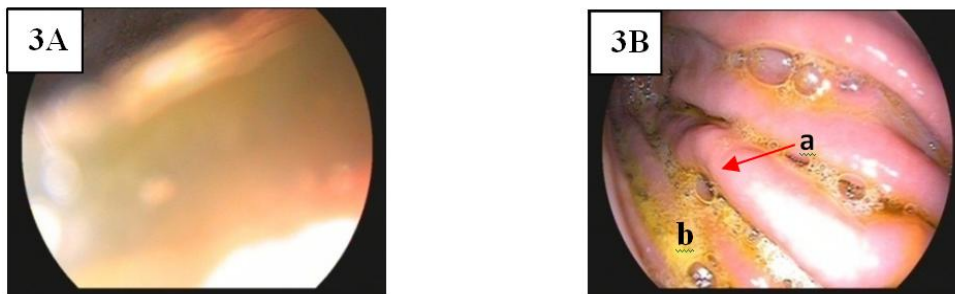
wing might be formed by combination of tissue and gas or tissue and *corpus alienum* that was hard like a bone (Ma and Gray, 2012). The X-Ray examination did not show hard *corpus alienum* in the stomach, therefore acoustic shadowing in this sonogram was caused by accumulation of gases in the stomach. Differential diagnosis for this case was not consistent with ultrasonography examination for liver, kidney diseases, cholestasis, IBD, and *hyperechoic* gastropathy (Penninck and d'Anjou, 2008). There were some differential diagnoses in this case that could not be confirm by ultrasonography examination such as esophagitis, chronic gastritis, and ulcer therefore further examination was needed to condition of esophagus and stomach mucosa.

### Endoscopy Examination

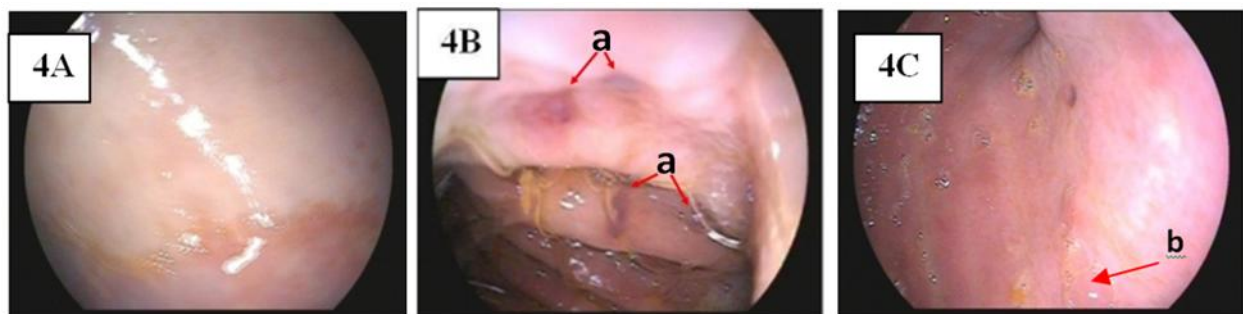
Endoscopy provides definitive diagnosis, help confirm diagnosis, and might have therapeutic use



**Figure 2.** Sonogram of dog gastric and duodenum suffered from upper digestive tract (A= Stomach, B= Duodenum, a= Stomach, b= Liver, c= *Sagital* duodenum, d= Transversal duodenum, e= Colon, f= Spleen)



**Figure 3.** Endoscopy examination of dog stomach with upper digestive tract (A= stomach full with gastric acid, B= Accumulation of bile fluid in stomach, a= Gastric granularity, b= Bile fluid foam)



**Figure 4.** Endoscopy of dog with upper digestive tract disorder (A= Erosion of stomach, B= Stomach ulcer, C= Concave stomach Mucosa, a= Ulcer, b= Concave mucosa)

(elimination of *corpus alienum*) (Boysen, 2015). Endoscopy examination on dog esophagus and stomach can be seen in Figure 3 and 4.

Figure 3A showed stomach full with gastric acid, and it was necessary to aspirate the fluid for endoscopy examination. Increased gastric acid production might be as a result of histamine stimulation such as gastrin that acting as a primer messenger (Parrah *et al.*, 2013).

The increase of stomach acid production could be because of stimulation of histamine such as gastrin that acted as primer messenger (Parrah *et al.*, 2013). Figure 3B showed stomach was filled with bile yellow foamy liquid. The present of bile foamy fluid in stomach indicated that there was a disturbance in stomach motility (Tams, 2003).

Stomach mucosa on Figure 3B undergone gastric granularity from normal smooth mucosa. This condition indicated chronic gastritis. The present of gastric granularity was related to disturbance of stomach motility in this dog. According to Birchard and Sherding (2006), gastritis was the cause of gastric motility disturbance. One of the causes of chronic gastritis was habit of eating *corpus alienum* (Ddine *et al.*, 2012). This was in agreement with suspicion of the dog owner in anamneses.

Figure 4 showed gastric superficial mucosal undergone color change to yellowish red and seem had a flat surface. This type of image was called erosion of gastric. One of condition that could cause stomach erosion was gastritis (Tams, 2003). Figure 4B showed some parts of mucosa that underwent color change to reddish brown surrounded by normal mucosa. This condition is called ulcer. Figure 4C showed stomach ulcer there was concave on stomach mucosa. Stomach ulcer could cause a concave on stomach mucosa (Birchard and Sherding, 2006). Endoscopy examination on esophagus did not show any abnormality. Diagnosis that could be obtained from endoscopy examination was chronic gastritis accompanied by ulcer and stomach erosion.

## CONCLUSION

Diagnosis based on imaging and endoscopy shows that the dog suffers from pathologic lesion such as chronic gastritis with ulcer and erosion of stomach. Step by step and comprehensive examination on digestive tract is very important to get a definitive diagnose in order to administer accurate therapy.

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